



Improving Pain Management Through an Integrated Multidisciplinary Model Driven by Accountability and a Focus on the Patient Experience

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1) Executive Summary

Allevio strives to bring ethical, effective pain management within reach while improving how the world manages pain. This is being done by focusing on the patient, provider, and payor experience. One in four Canadians suffer from chronic pain, many of whom are unable to access the appropriate specialists or resources for recovery. The current model for managing chronic pain is insufficient. It seeks to simplify the definition of chronic pain. In so doing, the definition minimizes the comprehensive impact on the lives of sufferers.

Far too many patients turn to opioids for short-term relief and are worse off for it—the clearest sign of a systemic failure and a need for change. The failure in the current system has led to a circumstance where the total annual cost of healthcare utilization from chronic pain patients in Ontario is over \$5 billion dollars.^[59] Even more alarming is the estimated annual healthcare cost to the province and private insurers of \$21,360 for a single opioid pain patient plus an additional \$17,544 annually in indirect costs for lost wages, reduced productivity, and absenteeism, to both employers and patients.^[5] Patients in the current system too often see poor outcomes, a very low quality of life, and even if there is a funded pain program nearby, many patients are on waitlists of months to years before receiving treatment.

Trusted by over 4,000 physicians across Canada, Allevio is proposing an accountability-driven integrated multidisciplinary pain management model that addresses the major challenges of the chronic pain and opioid crises, offering a commitment and solution to patients, providers, employers, and payors. Allevio's model of pain management delivers worthwhile patient outcomes: approximately 60% of our patients who come to Allevio on opioids for pain reduce their use. Additionally, 40% of those patients reduce their opioids intake to 0-5 mg/day. Over 65% of our radiofrequency patients also report being able to return to work.

Allevio facilitates care through a virtual and clinical model and believes a specific funding model, outside of the Ontario Health Insurance Plan (OHIP) model, will empower Allevio to leverage its outcomes. These outcomes help educate, collaborate, and integrate care between Allevio's data sets and practitioner training experience, offering local and timely services to each and every patient. OHIP has recently made it clear they will not accept claims for anesthesia-supervised ketamine and lidocaine infusions, but has said a funded multidisciplinary model of care is possible. While the authors agree that OHIP should not openly fund care where the evidence is mixed and the risk of drug abuse is high, a responsible and prudent payor should allow Allevio to continue offering the three-hour infusions that have been proven helpful in reducing opioid consumption, improving mood, and reducing pain. The authors seek to continue care for our patients that have shown marked improvement using it, and further request either the expansion of the service or the use of Allevio's protocol and outcomes as the benchmark for care. Other Allevio services, such as our prolotherapy and occipital nerve radiofrequency procedures, have seen between 65% to 75% of patients return to work during or following the treatment.

Allevio's model offers a higher standard of care, communication, and benefit compared to what is available to many OHIP patients today. We offer a compassionate and warm patient experience, which is critical when mental health is a comorbidity. Through years of outcome measurement, our care can be combined with a unique platform that we are offering through our prototype Patient Navigator app, available with base functionality via the Apple App Store, to deliver outstanding provider collaboration, patient experience, and payor value.

2) Introduction

Defining Chronic Pain and the Limitations of the Current Definition

The International Classification of Diseases (ICD) and the International Association for the Study of Pain (IASP) both classify chronic pain as “pain that persists past the healing phase of an injury, usually 3-6 months.”^[1-3] This definition is insufficient for a plethora of reasons, not the least of which is that it fails to recognize chronic pain that arises idiopathically or without a provoking injury. It utilizes arbitrary time points that have little to no relation to the underlying mechanisms and, most importantly, it relegates chronic pain to a mere symptom of an inciting injury, which most chronic pain specialists will attest is not always the case.

The definition of chronic pain as “pain persisting beyond normal healing” may be useful and may apply to pain post-surgery and the characteristic traits of migraine associated pain. However, this construct becomes inadequate when used to define other chronic pain conditions such as chronic musculoskeletal or neuropathic pain. These conditions are defined as chronic pain only due to the time criterion and fail to facilitate an understanding of the underlying mechanism.^[4]

Chronic Pain and Depression

Chronic pain is a major public health problem. The Canadian Pain Task Force reports that approximately 25% of Canadians are affected by chronic pain.^[5] One of the most prevalent and disabling mental disorders, depression, is the third leading contributor to the global disease burden.^[6, 7] A multitude of clinical studies have shown that chronic pain, as a stress state, often induces depression and an estimated 85% of chronic pain patients are also affected by severe depression.^[8-12] Patients suffering from chronic pain-induced depression have a poorer prognosis than those with chronic pain alone. Chronic pain and depression are closely correlated in occurrence and development, as well as in their management and improvement.^[13]

Although both chronic pain and depression are highly comorbid, neither the corresponding pathophysiological mechanisms of chronic pain and depression nor their mutual correlation have been identified. This poses a significant challenge for the treatment of chronic pain with associated depression. However, recent studies have revealed some overlaps between pain-induced and depression-induced neuroplastic changes. These overlaps in neurological changes facilitate the occurrence and development of chronic pain-induced depression. In particular, injury sensory pathways of the body share the same brain regions involved in mood management, including the prefrontal cortex, insular cortex, anterior cingulate cortex, hippocampus, thalamus, and amygdala, which form the structural basis for explaining the coexistence of pain and depression.^[14]

A Push to Change How Chronic Pain is Defined

As previously stated, chronic pain has become much more prevalent. The Canadian Pain Task Force estimates that 7.63 million Canadians suffer from some form of chronic pain.^[5] This pervasive ubiquity of chronic pain has provided the impetus for some recent advances that have defined chronic pain as a separate condition and not as a mere symptom. Our clearer understanding of the peripheral and central nervous system processes empower us to improve how we diagnose and treat pain as a condition, rather than merely a symptom.

The Opioid Crisis, Abuse, and How Pain Clinics Contribute to the Problem

Discussions on chronic pain immediately draw links to pharmacological analgesics and narcotic opiates that were intended for short-term use, but are often prescribed for longer periods. Some pain clinics are quick to prescribe opiates for a few reasons: emergentologist physicians often focus on fast-acting pharmacological interventions as a practice approach in triage, patients seek opiates for pain relief because they are desperate, and physicians prescribe opioids because they feel compelled by the plight of their patients and often lack the modalities or extensive training in identifying, treating, and alleviating pain as a disease rather than a symptom.^[15-16] A comparative study evaluating the use of opioids in Canada and Sweden found that 70% of post-operative patients in Canada filled opioid prescriptions compared to only 11% in Sweden.^[17] According to the Toronto Star, approximately 60% of patients going into clinics receive opioid prescriptions, highlighting how often opioids are used as a first line treatment for chronic pain. This overzealous use of opioids has led to the opioid crisis.

The opioid crisis, characterized by opioid use, abuse, opioid use disorders (OUDs), and the many preventable overdose deaths that occur as a result, is a health crisis costing tens of thousands of lives and billions of dollars.^[19-23] To illustrate the current trend and trajectory of the opioid crisis, the number of individuals who have enrolled in Opioid agonist therapy (OAT) in Ontario has skyrocketed from 6,000 in 2000 to 40,000 in 2016.^[24, 25] Additionally, Health Canada's 2020 Pain Task Force Report highlighted some key takeaways regarding the disproportionate impact that both chronic pain and OUD have on remote and underserved communities.^[26] This is, in large part, due to a lack of availability and access to resources and specialists.

Beyond the comorbidity and shared neuro-structural features of chronic pain and depression, an individual's predisposition to an OUD is very highly correlated to their state of mental health. Most individuals who suffer from some form of OUD also suffer from poor mental health. Preliminary analysis of a large-scale retrospective study indicates that 87% of individuals with OUD in Ontario have been clinically diagnosed with one or more mental health disorders. There is a strong body of evidence that factors beyond the availability of OAT and other drug treatment programs have an important role in the prevention and treatment of OUD. Factors include: social determinants of health, access to non-opioid pain management, the quality of the pain management program, patient education, perceptions of trust, and empathy levels of the treating clinicians.^[27-31] Integrated chronic pain management has been adopted and implemented in clinics across Canada and the United States, but decades of research into the existing integrated models show that there are still some major limitations. Patient challenges such as non-compliance, adherence, and relapse are the primary limitations in the successful treatment of patients through the clinic and self-management.^[62-64] These pitfalls and limitations can be addressed through increased communication and empowerment of patients in their treatment plan and care, which will increase the patient's commitment to the program and their chances of success.^[63-65]

Consequences of Misinformed Policy Decisions Based on Incomplete Data

The chronic pain and opioid crises have been and continue to be a public health and societal challenge that has risen to the level of national and international policy agendas. Unfortunately, one of the largest barriers to formulating a strong and decisive plan or policy to address these crises in Ontario is the lack of consensus on the cause, nature, or extent of the problem. This leads to uncoordinated solutions. The appropriate solution to address the chronic pain and opioid crises varies widely between the healthcare sector, the pharmaceutical industry, community outreach programs, and law enforcement. The approaches are often incompatible.^[32-36] This disjointed approach often leads to policies or programs that are implemented without considering all the relevant factors, which invariably leads to poor outcomes. For example, in 2012, Ontario policy makers held the belief that a single drug was to blame for the increasing opioid issue, which came to a head when OxyContin was removed from the Ontario Drug Benefit.^[37]

When examining the rate of OxyContin prescriptions alone, the policy seemed logical. Prescriptions of oxycodone in Ontario had increased by 850% between 1991 and 2007.^[19] However, in hindsight, that policy oversimplified a very complex and multifaceted issue, leading to unintended consequences that would exacerbate the emerging opioid crisis. The policy focused solely on a single drug in 2012 and drove opioid users to alternative opioids once their drug of choice was no longer available. Prescriptions for opiates increased exponentially.^[38-42] To add insult to injury, the Toronto Star reports that, the structure of the healthcare system at the time permitted some physicians to exploit patients to increase their OHIP billing.^[43] This lapse in judgement in policy development is but one example of policy not aligning with evidence and research.

There is a consistent discrepancy between research and health policy.^[32-34] One such discrepancy is the degree of importance and the role of non-opioid multidisciplinary pain management clinics in combating and preventing OUD. A multitude of studies have shown that access to high quality non-opioid or opioid alternative multidisciplinary pain management clinics in a patient population that is educated on their benefits are six times less likely to turn to opiates to manage their pain. Therefore, this significantly reduces the risk of opiate abuse.^[15-17] While OAT is invaluable to combating the opioid crisis, it is a reactive program in response to an existing crisis. What is needed are proactive solutions to address the root causes of the over-prescribing of opioids and the risks of OUD. It is critical to align healthcare policy and public opinion with rigorous and comprehensive research findings to successfully develop and implement sustainable, effective pain management programs and policies to combat chronic pain and the opioid crises.

3) The Problem

The relationship between chronic pain treatment, opioid use, and OUD is important to highlight for prevention and treatment purposes and should be considered by policymakers relating to both the chronic pain and opioid crises. Chronic pain has begun to enter the collective consciousness in Canada and is progressively catching up to the level of awareness for OUD, yet there continues to be a discrepancy between research and policy ideas.^[15] This discourse in Ontario has resulted in debates surrounding the approach, but the overarching problem can be defined by these four key issues:

1. Improving patient outcomes, quality of life, and function or the timely return to work using an evidence-based multidisciplinary approach
2. Managing chronic pain without increasing the risk of opioid use and misuse
3. Increasing access to pain specialists and resources to underserved and remote communities
4. Reducing the direct and indirect costs associated with chronic pain and opioid use or misuse

Pursuing a solution or enacting a new policy should not be taken lightly, as it impacts not only chronic pain sufferers and OUD patients, but all Ontarians. Any proposed solution must address these four key areas of concern and be informed by research that is evidence-based and multidisciplinary in nature. Failure to address these four key issues and the inability to meet these criteria will likely result in a similar outcome to the policy decisions of 2012 that only aggravated the problem.

4) The Solution

A novel integrated multidisciplinary pain management program built on a foundation of accountability to the patients and payors that is driven by evidenced-based decisions has the capacity to elevate the standard of care for chronic pain patients in Ontario while also saving Ontario taxpayers up to an estimated \$21,316 in healthcare costs per year per opioid pain patient and an additional \$17,544 in savings to employers and insurers from indirect costs of lost productivity and absenteeism per year per opioid pain patient.^[5] At its core, the integrated multidisciplinary pain management model operates on four fundamental principles: offering the highest standard in multidisciplinary care, accountability to the patient and payor, utilizing technology to improve the patient's access to specialists as well as enabling specialist collaboration, and utilizing data, research, and evidence to inform decisions and policies. This model will improve pain patient outcomes while concurrently decreasing rates of opioid use and reducing direct and indirect costs.

A Model that Provides the Highest Standard of Care

To understand the integrated multidisciplinary model of pain management and how it maximizes the likelihood of success in treatment of chronic pain, it would be best to start with understanding treatment adherence. Treatment adherence is a long-recognized issue in the successful management of healthcare outcomes, especially in chronic illness.^[46] Understanding the complex and nuanced root psychological causes of non-adherence in treatments allows the integrated multidisciplinary model to address these factors: depression, anxiety, post-traumatic stress disorder (PTSD), and learned helplessness.^[47-49] One of the primary factors implicated in the poor outcomes observed in traditional models of chronic pain and OUD management is the compartmentalization of how treatment is delivered.

As stated previously, chronic pain, OUD, and mental health are intrinsically associated and affect the same neurological systems and structures while each condition directly affects the progression and state of the other.^[8-14, 27-31] Any novel management model must be multidisciplinary in nature and must address both the primary (chronic pain and OUD) and secondary (depression, learned helplessness, anxiety, PTSD, etc.) conditions. For example, ketamine-lidocaine infusions, one treatment modality employed in the integrated multidisciplinary model, have been shown to be effective for treating neuropathic pain and also have indicated uses in the treatment of depression, anxiety, and PTSD.^[18] Additionally, when required, any treatment protocol will work in conjunction with a comprehensive mental health program. Offering patients access to mental health clinicians and a multitude of tools to help the patient manage their mental health is a cornerstone to success. Given the unique sensitivities and behaviours of patients that present with both chronic pain and OUD, addressing factors such as learned helplessness optimizes treatment adherence for this population and thus addresses the primary challenge in implementing an effective treatment strategy.

Compassionate Pain Management Driven by Data and Evidence

The model codifies data about the patient and their responses to treatment, which informs decision-making in a manner that adapts to patient behaviour. The integrated multidisciplinary approach operates on an outpatient basis and strives to create a treatment environment and process that is individualized to the patient, remains consistent with the latest research and evidence-based practices, and seeks to optimize the patient's quality of life and physical lifestyle while being fiscally responsible. Chronic pain severity and complaints vary greatly from patient to patient. The current care model relies on a single metric of wellness. Historically, this has made the need to measure and quantify the amount of pain as the central treatment outcome.

These resulting pain scales often lead to unnecessary opioid prescriptions or excessively invasive interventions that immediately reduce the experience of pain, but have significant associated risks and costs. The integrated multidisciplinary model assesses the patients on metrics and measures beyond simple pain scales and provides for an initial proposed non-opioid intervention with further treatment to be determined by examination and deduction of the outcome measures that quantify overall function rather than pain alone. Poor levels of functioning lead to a higher level of multidisciplinary care, as opposed to acute interventions which may temporarily and immediately reduce pain.

Offering Accessibility and Care in Remote Communities Through Technology

Beyond providing in-person access to a team of multidisciplinary specialists, the model improves chronic pain patients' access in remote areas or underserved areas to these same specialists through an integrated proprietary patient access portal. This model is digitally facilitated and will allow chronic pain patients to engage with specialists for interventional and clinical management of their pain, while also promoting and improving the patient's ability to self-manage. The digital patient management program will enable the patient and their attending clinicians to track and monitor a vast array of important clinically validated metrics: level of pain, level of function, mental health and mood, quality of life, and medication use. The program utilizes a validated screening tool to assess the patient's scope, level of care they require, and their suitability for digital self-management. The digitally facilitated care platform will be integrated seamlessly onto existing telemedicine infrastructure, thus enabling pain patients in remote or underserved areas to obtain access to pain specialists and a team of multidisciplinary experts who can then perform a consultation, assessment, and formulate a treatment plan. This empowers management of a local health team to participate in key areas of that specialized treatment plan.

Accountability and Sustainability of the Model

The flexibility of the integrated multidisciplinary model accommodates treatment with an individual's needs over time. Individual patients often have a relapse of pain symptoms between periods of improved function. The flexibility of the model allows a patient to increase or reduce the amount of care they receive over time. Studies on similar integrated multidisciplinary treatment programs generated significant cost savings, creating positive patient outcomes, and promoting the sustainability of the model.^[50] In the integrated multidisciplinary model, patients begin at a high level of care with a comprehensive initial assessment.

Although this means a higher initial financial burden, patients can then be properly directed at this early stage to the modality and approach to care that they need. That may include: ketamine-lidocaine infusions, radiofrequency ablations, psychological support and counselling, and/or physical rehabilitation. Only the patients at the lowest levels of function need to be maintained at an intensive level of care. Those who do not need a high level of care will have fewer visits with continued monitoring. As the levels of care are dynamic, each patient's level of care will vary over time. In addition to the cost reductions from a tailored level of patient care, the vast majority of cost savings to public and private payors come from reductions in—and potentially the elimination of—narcotic use.

Opioid pain patients represent a significant burden on the healthcare system, over 40% of which require emergency department intervention, 10% are hospitalized, and a median rate of seven physician visits annually.^[60] According to the Ministry of Health, the total cost of chronic pain patients in additional healthcare system utilization is \$5 billion dollars in Ontario.^[58,59] The integrated multidisciplinary model addresses every facet of the chronic pain and OUD problem by offering patients access to pain specialists in addition to a full team of healthcare professionals who will address every ancillary cause of the patient's pain.

That may include, but may not be limited to: chiropractors and physiotherapists for musculoskeletal complaints, mindfulness training, psychologists, and psychiatrists that help address underlying depression, learned helplessness, PTSD, or other mental health issues that exacerbate chronic pain.^[7-14, 31] Given the benefit of this approach to the patient, the transparency and accountability to the patient and the payor alongside the cost savings of the proposed model, the integrated multidisciplinary model is the best solution for the delivery of care to patients with chronic pain.

5) The Benefits and Costs

The integrated multidisciplinary pain management model encompasses four fundamental principles which combine to offer the highest standard in multidisciplinary care: accountability to the patient and payor, utilizing technology to improve the patient's access to specialists, and utilizing data, research, and evidence to inform decisions and policies (see Figure 1).

The model aims to bring four key benefits: improvement in the patient's quality of life, permit the patient to return to work sooner, decrease or eliminate opioid drug use, and prevent the need for emergency medical interventions such as emergency room and hospital visits. These benefits ultimately reduce direct and indirect costs and improve productivity.

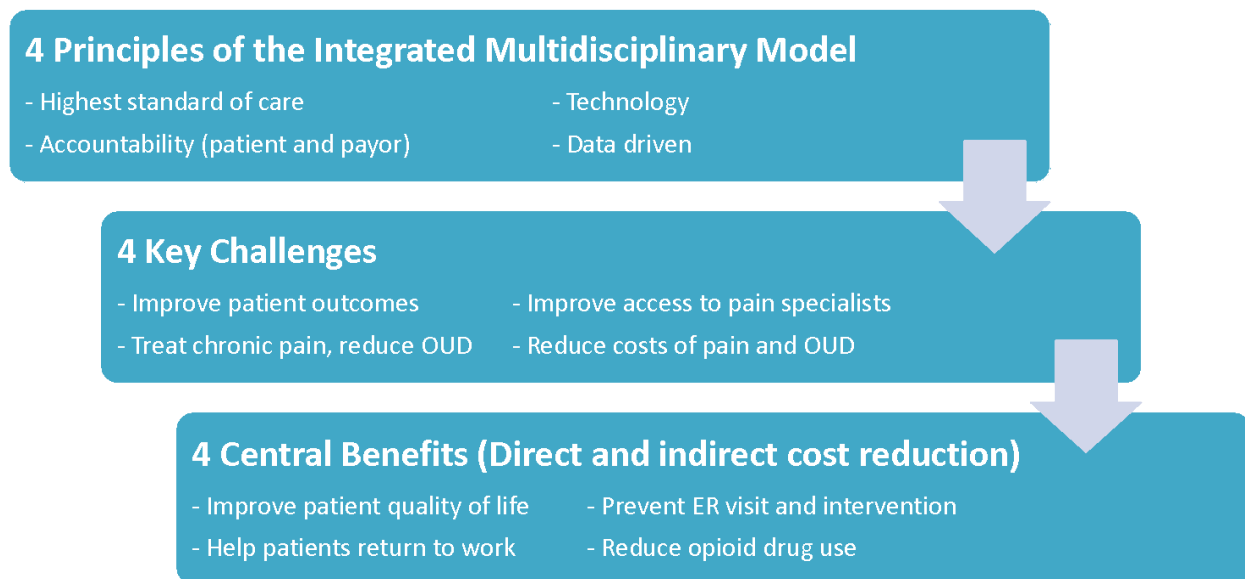


Figure 1. Diagram of the four principles of the integrated multidisciplinary pain management model, the four key challenges of the chronic pain and opioid crises, and the four central benefits of adopting the integrated multidisciplinary pain management model.

As noted, the estimated annual direct and indirect healthcare costs to the province and private insurers for a single opioid pain patient is \$21,360. The estimated \$17,544 in annual indirect costs such as lost wages, reduced productivity, and absenteeism, are incurred by employers and patients.[5] These costs are for a chronic pain patient undergoing a management protocol that does not offer a positive outlook of rehabilitation. This means the prospect of reducing or eliminating these recurrent costs for the province, private insurer, employer, and patient are low if opioids are used. Implementing the proposed accountability-driven and integrated multidisciplinary pain management model will have a two-fold benefit for the patients and for the payor, whether it is the province, private insurers, or the employer: patients will have access to individualized care that applies cutting edge and evidence-based pain management tools and techniques that have a significantly better prognosis. The payor can expect the high recurrent costs of an opioid pain patient to be substantially reduced or eliminated, as the patient improves and is rehabilitated. Similar models of care for pain management and OUD have been implemented in other jurisdictions and their impacts are well-studied with very positive patient outcomes and substantive savings in direct and indirect costs.[50-54] Knowing that the annual aggregated healthcare and indirect costs are \$38,904 per opioid pain patient, a hypothetical example of a treatment plan at Allevio would encompass an assessment at \$3,500 and six ketamine-lidocaine infusions at a cost of \$1,700 each for a total annual cost of \$13,700 and an annual savings of \$25,204 per patient.

6) Why Allevio?

Allevio has conducted a multitude of retrospective and observational studies around chronic pain, opioid use, depression and mental health, as well as non-opioid chronic pain interventions such as ketamine-lidocaine infusions. This intensive focus on research has made Allevio de facto experts in the field of multidisciplinary chronic pain management. Allevio's comprehensive research, supported by a vast array of data, has validated its model of integrated multidisciplinary pain management as well as the benefits of its unique patient experience.

To illustrate, in a retrospective study of prolotherapy patients, 63.5% of the patients who were not retired were able to return to work after treatment. In another retrospective study of occipital nerve radiofrequency, 78.4% of the patients who were not retired were able to go back to work after treatment. In a retrospective study of cervical radiofrequency, 67.7% of the patients who were not retired were able to go back to work after treatment.

One study of 171 patients undergoing Allevio's ketamine-lidocaine infusion protocol with multimodal support over the 36-week study period saw patient pain scores substantially decrease (see Figure 2). This was along with a marked decrease in depression scores (see Figure 3) and improving the patients' mood and overall enjoyment of life (see Figure 4). These positive patient outcomes come at an annual cost of less than half the estimated direct and indirect healthcare costs of opioid pain patients (see Figure 5).[5] In a separate retrospective study, preliminary analysis of patient data from 2013 to 2019, of the 3,313 Allevio patients who were using narcotics at intake, 838 patients had decreased their narcotic consumption, with 559 of those patients eliminating narcotic use after a lidocaine and ketamine infusion.

The cost-saving implications of these preliminary results are substantial to the province, employers, and insurers. Take, for example, the case study of an Allevio patient who suffered a work-related injury and was subsequently placed on short-term disability for 180 days. Assuming this employee earned the average Canadian salary of \$5,241/month, according to Statistic's Canada's 2019 Canadian Income Survey, it would cost the employer roughly \$7,200/month due to the cost of insurance and replacement.^[61] This patient was prescribed ketamine-lidocaine infusions as part of their treatment plan.

The patient averted the use of opioids, their mood significantly improved, and this employee was able to continue working as a result. This case study led to a savings of \$5,000/month to employer and insurer. As the preliminary results show, this case study is not an isolated instance of the patient outcomes that Allevio regularly delivers to others. Consider the potential cost savings when scaling these results to even a mere 1,000 employees/patients. Allevio's multidisciplinary model has the demonstrated potential to reduce and eliminate opioid use for some, thus largely reducing or even entirely removing the recurrent costs associated with opioid use and misuse.

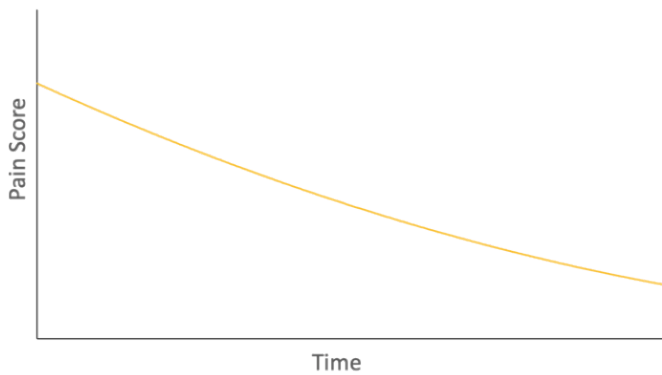


Figure 2: Average pain scores over time of 171 patients undergoing a 36-week protocol of ketamine-lidocaine infusions.

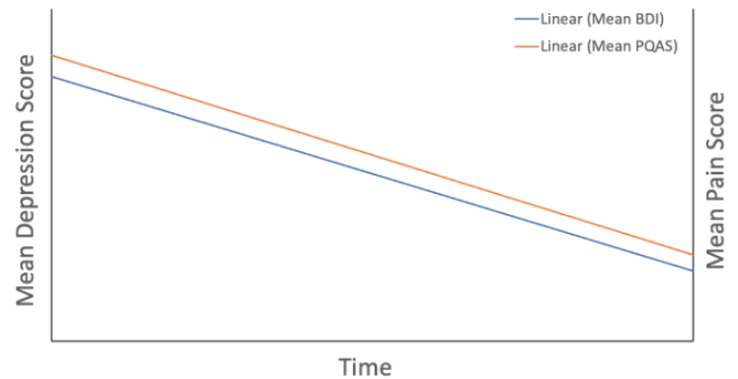


Figure 3: Linearized depression and pain scores over time of 171 patients undergoing a 36-week protocol of ketamine-lidocaine infusions.

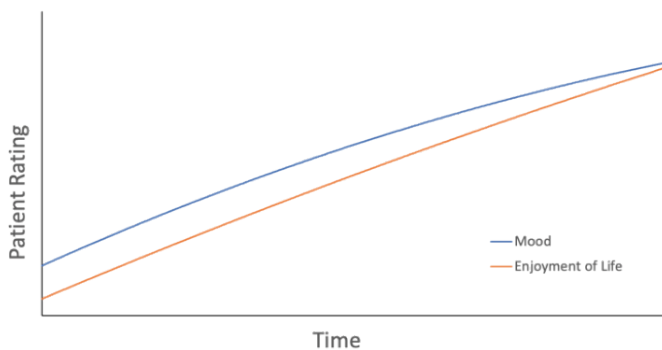


Figure 4: Average of patient-rated mood and enjoyment of life scores over time of 171 patients undergoing a 36-week protocol of ketamine-lidocaine infusions.

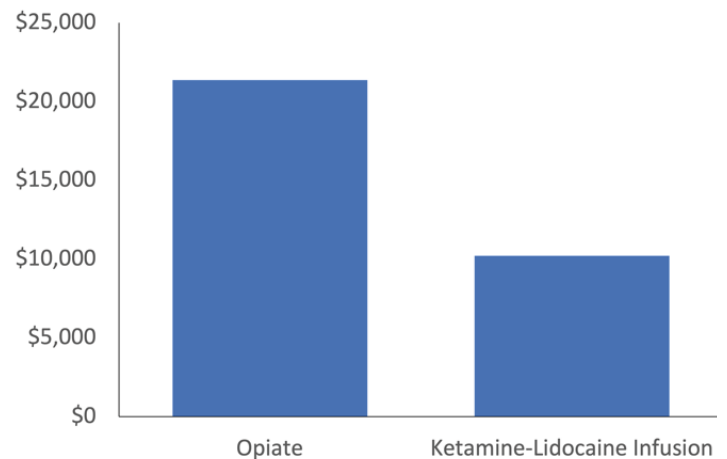


Figure 5: Cost comparison of annual direct and indirect healthcare costs of a single opioid pain patient compared to the annual cost of a single patient undergoing ketamine-lidocaine infusion treatment at Allevio.

Lastly, in a study evaluating patient improvements in pain and their level of satisfaction with Allevio's pain management model, Allevio patients rated their pain improvements and level of satisfaction in a fashion that is predictable and expected—improvements in pain leads to higher levels of satisfaction with their treatment (see Figure 6). However, when comparing results taken from a similar large-scale study of a traditional pain management program that used the same Likert scale derived measurement metrics for improvement in pain and patient satisfaction, an intriguing outcome can be observed. In the traditional pain management program, patients' pain did not improve significantly. However, patients rated their level of satisfaction with their treatment in an unpredictable fashion, despite not receiving any meaningful improvement to their pain, patients still rated that they were satisfied with their treatment. This paradoxical behaviour, known as learned helplessness, has been observed and studied before.^[55-57] Learned helplessness is a state that occurs after a person has experienced a negative or stressful situation repeatedly.

Over time and prolonged exposure, the person comes to believe that they are unable to control or change the situation, so they do not try—even when opportunities for change become available.^[55-57] Figure 6 demonstrates learned helplessness as the patients in the traditional pain management program deem that the program outcome was satisfactory, despite a lack of real or meaningful change in their pain. Learned helplessness is highly comorbid with chronic pain, depression, anxiety, and PTSD.^[57] Allevio's unique approach of compassionate care strives for each and every patient to have the trust, support, and tools they need to improve their function, if not their condition. Allevio's multidisciplinary pain management model is steeped in an organizational culture of stewardship, for the patients, payors, and the public, making Allevio the ideal partner to deliver the new model of integrated multidisciplinary pain management.

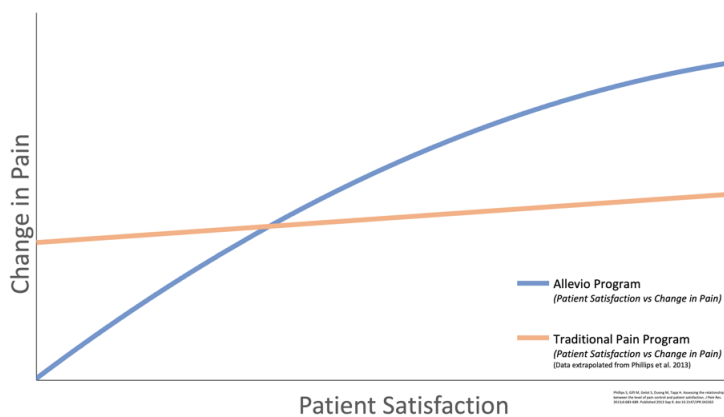


Figure 6: Change in patient's pain modelled with patient satisfaction of Allevio's Pain Management Program compared to the same metrics of a traditional pain program from a large-scale study.

7) About Allevio

Located in Toronto, Ontario, Allevio Pain Management is Canada's preeminent integrated multidisciplinary pain management clinic hosting a team and network of pain specialists, including anesthesiologists, physiatrists, chronic pain physicians, chiropractors, osteopaths, physiotherapists, occupational therapists, dieticians, mindfulness coaches, nurse practitioners, nurses, and international medical graduates. The team works collaboratively to address the complex disease of chronic pain.

Allevio has always focused on patient-centric care and advocacy, conducting impactful novel research and integrating the most current and best evidence-based treatments and practices, such as ketamine-lidocaine infusions, radiofrequency ablations, prolotherapy, manual therapy, and mindfulness training. Allevio's reputation of compassionate patient-centric care is unparalleled and built on a track record of positive patient outcomes and an organizational culture of stewardship for the patient, the payor, and the public.

8) Summary

The chronic pain and opioid crises are public health and healthcare issues that cannot be ignored. The current approach to managing chronic pain is insufficient, with 25% of Canadians suffering from chronic pain at an estimated annual healthcare cost to the province and private insurers of \$21,360 for a single opioid pain patient and an additional \$17,544 annually in indirect costs of lost wages, reduced productivity, and absenteeism, to employers and patients. The total annual cost of healthcare utilization in Ontario alone is over \$5 billion dollars.^[5, 59] Allevio is proposing a solution to the rising toll of chronic pain and opioid misuse. By implementing and scaling Allevio's accountability-driven and integrated multidisciplinary pain management model, stakeholders can expect improved patient outcomes with less pain and better quality of life, increased accessibility of pain specialist expertise and resources for patients in underserved and remote communities, accountability in outcomes and decisions that are driven by data and evidence, and reductions in both the direct and indirect annual per opioid pain patient cost by more than half.

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